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ABSTRACT-Industrial chemistry in the Upper Midwest consista principally of compounding, formulating and specialty manufacturing rather than the production of basic chemicals. The economic position of industrial chemistry is, nevertheless, significant because many of the region's major corporations are employers of technically-trained personnel and are substantial chemical users. This paper provides a non-quantiative overview of chemical technology applications and developments in some of the area's key industries as a record of the past, a measure of current activity, and as a possible indicator for the future. The paper also notes that the large investment demands, complexity of regulations and distance from major markets restrict growth potential for small concerns.

In this bicentennial year 1976 - which some prefer to call a "buy" centennial - it may be quite appropriate for those in chemistry-related activities to look back to where we have been so that we can determine were we are and, perhaps, find the guidelines for where we are going. The focus of the presentation is on the chemical industry in the five states of the Upper Midwest. This is not an area heavily devoted to manufacturing materials that are generally considered industrial chemicals,. Rather, it is a region whose companies are emgaged in compounding, formulating or specialty manufacuting. Area industries are devoted to certain chemical technologies such as paper-making, milling, brewing, food manufacture, grain processing, paint production, electroplating, cosmetics, tanning, and some other such chemical operations.

The chemical industry as a whole can be classified generally in two inclusive groupings.

One would be the basic producers of chemicals, typfied for example by those on the Gulf Coast area of Louisiana and Texas. They actually manufacture specific chemical raw materials starting from petroleum and natural gas. Those inductrial chemical companies, for an instance, run distillation units and produce ethylene, which is then converted to polyethylene and other derivative products.

The other grouping, the kind of companies more typical in the Upper Midwest, utilize a substantial volume of chemical raw materials to p
them consumer-oriented, or use the basic chemicals in some kind of processing. These companies are, thus, both chemical material consumers ans chemical product producers.

There are, of course, some exceptions, like the 3M company, which produces resins and other chemicals used in making adhesives specialties plus numerous products that few outside the company know much about. Another Midwest exception is H. B. Fuller & Company, which now produces some captive chemical raw materials. Then there's Economics Laboratory, which produces a number of intermediate chemicals used in making cleaning and sanitizing compounds and other detergent products. Another basic chemical manufacturer that we might not usually think of is St. Paul Ammonia Products, a producer of ammonium nitrate. Over in Wisconsin, there's a Wyandotte Chemical Company plant making caustic soda, largely for use in nearby paper mills.

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At one time there was still another manufacturer of basic chemicals in St. Paul, Raymond Laboratories, a division of Rayette, Inc., whose end product line includes Aqua Net hair spray. That company is now a division of Faberge. In the earlier period they produced sodium lauryl sulfate, sodium bromate, thioglycolic acid and a number of other cosmetic raw materials locally. These chemicals were both for their captive use and for sale to other cosmetic manufacturers. Most of that company has moved east and is no longer a producer of raw materials. But an aerosol filling line is still operated in St. Paul and raw materials are purchased for formulation there. In general, the raw materials for this area's cosmetic industry are shipped in from outside the five-state area. The Toni Division of Gillette, with a chemical manufacturer, but most of Toni's production facilities are in the Chicago area, and chemicals made there are shipped to St. Paul. It is believed that Toni is phasing out a number of chemical production operations for various reasons and is broadening its outside chemical demand.

At one time, Archer Daniels Midland Chemical division was a big factor in the Twin Cities area, having a local research facility and a number of pilot plants. Their chemical activities were, however, brought out by Ashland Chemical, and both the research facility and pilot functions have moved out of our area.

Chemical purchses by area firms

The compounding or formulating type of activity naturally means that chemical raw materials are bought elsewhere, so this region's firms are fairly active shoppers. As an example, the 3M catalog of chemical requirements runs through many pages and theough many technologies. Although most of 3M's technology currently is based on coatings of one form or another, the company buys just about every type of chemical. Economics Laboratory, as a heavily service-oriented organization, buys and produces sanitizing agents, wetting agents, chelating agents and many other materials designed for use in developing both industrial and consumer cleaning items. H. B. Fuller Company, realizing that old-fashioned glue was literally a "dead horse" (you should pardon the pun) broadened its local adhesives business into an international company. It is involved with coatings and resins, mostly PVA produced in the Cincinati area. The company is now committed to making specialty resins, epoxy, types, for use in coatings, a growing technology.

Cargill, as everyone knows, is an international giant in the grain industry, trading in grains and transporting soybeans and feed grains all over the world. They have made a number of forays into the chemical industry and currently produce vegetable oils, urethane resins and other specialties locally or nearby. They also have a number of chemical producing

operations elsewhere in the United States. It was hoped a number of years ago that Cargill would develop more quickly into a substantial producing factor within the chemical inductry nationally, but they appear to be at the infant stage. The company could, howe-er, expand greatly within a short period of time as a chemical producer. It does make polyester resins for boats, snowmobiles, marble-like tops an so on.

Genral Mill's research facilities are in this region, as are the headquarters of General Mills Chemicals, Inc. Their production is, however, outside the Upper Midwest.

Consumer-oriented operations

Turning to the area companies whose chemical output is essentially consumer-oriented, ther are several points of interest involving people as well as products. These firms employ chemists or chemical engineers to do basic research. product development work, or to help in the processing of their various products.

The region's important cosmetic industry was born in St. Paul with formation of the Toni Company in the early 1940's. As a result of the formation of Toni and development of its processes, companies such as LaMaur, Palm Beach Cosmetics, L & K Laboratories (which subsequently was sold to Clairol) and Minnetonka Labs were set up and all progressed. These cosmetic companies use such chemicals as wetting agents (for example: sodium lauryl sulfate, alph olefin sulfonate and diethanolamides) to formulate shampoo products. The same products also require aromatic perfume compounds and dyes to achieve attractive sales properties. A number of these companies also make lotions which contain various types of fatty alcohols, stearic acid, emulsifiers and preservatives. Chemists work actively at these companies to develop new products for the consumer market. In addition, a good deal of time in the cosmetic industry (as well as other inductries) is devoted to satisfying government regulations concerning the safety of products and this often requires input from qualified chemists.

Another chemical consuming industry that is very large in this area is paper-making. Paper mills utilize substantial quantities of clays, titanium dioxide, coating resins, dyes, water-resisting agents, alkalies, biocides, chelates, etc. Paper companies are frequently a major target for chemical salesmen, since tank cars and carloads of material move into the paper mills every day.

Then there are the breweries. Although their number has declined in this territory during the last 20 years, the remaining breweries still use such materials as, for example, gum-arabic as a processing aid. More importantly, they use large quantities of cleaning materials and detergent compounds. This, in turn, has supported a large number of detergent formulators in the five-state area. The detergent producers make and sell everything from rug shampoo for office buildings to sanitizing compounds for canneries, cleaning compounds for breweries, dish wash and car wash cleaning specialties, and more. All these cleaning compounds require a wide variety of raw materials, few or none of which are produced in this area. A few are chelating agents to tie up the calcium and magnesium in the water, wetting agents such as linear alkylate sulfantes or the nonylphenols, caustic soda, soda ash, phosphoric acid, dyes, masking agents and other formulating additives.

The largest cleaning compound company in our area is Economics Laboratory, with worldwide marketing. A number of medium to small size companies such as Multi-Clean and Monarch divisions of H. B. Fuller, Fremont Industries, Chaska Chemical and others also utilize chemicals and employ chemists.

The paint industry, in terms of the number of manufacturers, has declined in recent years, largely due to mergers. However, the dollar output of product has grown modestly. This industry uses pigments, resin emulsions, oils, solvents of all types, dyes, wetting agents, biocides, etc. The two largest in this industry are Valspar Corp. and Honeymead. Closely allied in a sense with the paint industry is int ink inductry, and this seems to be growing in the area as a result of growing graphics production. The largest ink company in the area is Consolidated Printing Ink, a division of Sinclair & Valentine. Inmont Corporation has a local plant as do Genral Printing Ink, Kohl Madden, and several independent producers like Northern Printing Ink and Roberts & Porter Ink. There are also a number of ink companies in Wisconsin and Des Moines, Iowa. All use pigments, large quantities of carbon black, and various vehicles used to set up their ink.

Finally, and regionally significant, is the food inductry. It provides a number of products and utilizes materials such as leavening, pyrophosphates, preservatives, food colorings, flavorings and the like. But the single largest contribution of the food industry to chemistry is in the research area and in the nutritional develpment of new convenience foods.

What are assurances for the future?

This, so far has looked back and examined where we are as far as the shemical industry is concerned. It is by no means an exhaustive analysis and it is not a quantitative review. Mostly it serves to reassure ourselves that there are, in fact, busy chemists and chemical engineers putting things together. But there is a long way to go before the area can be a real factor in the chemical manufacturing business and in major chemical production.

Yet it is reassuring to realize that the contributions of chemists to research and product development are definitely a factor in growth of the broader chemical industry in the United States. Without the impact of local brain power for developing new products and new usage ideas, the production of many chemicals would be far less necessary.

While this region's chemical industry shows potential for growth, that growth seems only likely to occur among the medium-sized and larger chemical companies. It is becoming extremely difficult for new small conserns to get started because capital needs are great and the technology of formerly "simple" production such as in the cosmetics or cleaning compound fields is becoming ever more sophisticated. Government requirements for extensive testing of many chemicals used in paints and coatings, cosmetics, adhesives, and almost everything make entry economically prohibitive for small operations, no matter how good the basic ideas on which they are organized.

All such factors will act as barriers to formation of new chemical companies and also other types of manufacturing everywhere. There will, however, always be opportunity for the chemist or chemical engineer who has new and significant ideas to put forth. It may be necessary to function within the framework of a company or be attached to one of the various research institutes founded by the government or quasi-government agencies.

In this more complex society the entrepreneurship that was possible in the past will be much more difficult in the future. You can rest assured, however, that those producers employing chemists and chemical engineers will depend upon them more heavily in the future; that chemists and chemical engineers will take active roles not only in the research-development phases but also in the management and in the financial aspects of companies where they are working. Hopefully the chemists/chemical engineer also will take on a much more active civic, political role in our communities, since scientific expertise is sadly lacking in political life and the input of technically trained, thinking people is most essential in these health-conscious, ecologically concerned times.